CLAIMS

1. Method of predicting the quantity of a printing product necessary for printing a document, characterised in that it comprises of storing the whole of said document in the form of digital data, creating, from these data, a table (T) describing at least part of a monochromatic component of said document, said component

5   corresponding to said printing product and each cell of said table representing a pixel, counting (6) the number of so-called switched-on pixels in this table and deriving therefrom a necessary quantity (10) of said printing product before enabling or demanding said printing.

2. Method according to Claim 1, characterised in that an aforementioned

10   table (T) is created with limited capacity, less than the capacity necessary for describing said monochromatic component of said document, in that groups of pixels of said monochromatic component of said document are entered therein successively, in that on each occasion the number of switched-on pixels is counted (6) until all said monochromatic component of said document has been entered in

15   said table and its switched-on pixels have been counted.

3. Method according to Claim 2, characterised in that it consists of creating each table of limited capacity from digital data representing adjacent bands (3) of said document.

4. Method according to Claim 3, characterised in that overlapping

20   broadened bands (3) are selected, in that, using the corresponding digital data, at least one enlarged table (T) is created, allowing an image reprocessing entailing a modification of the switched-on pixels, in that said table is modified by applying a known correction algorithm (5), and in that the counting (6) of the switched-on pixels corresponding to the excess part of said enlarged table is

25   excluded.

5. Method according to Claim 4 for colour printing, characterised in that as many enlarged tables are created as there are colours, each describing a monochromatic component of said document, in that, in a manner known per se, a correction algorithm is applied to all the tables before separately effecting

the counting (6) of the switched on pixels in each table for predicting the different quantities of printing products required, of all the colours concerned.

6. Method according to claim 1, characterised in that it includes a calculation step (10) consists of multiplying the number of switched-on pixels by a value representing an elementary quantity of said printing product.

7. Method according to Claim 6 for an inkjet printing system, characterised in that said value represents the value of a droplet of printing product ejected.

8. Method according to Claim 7, characterised in that said value is preselected according to predetermined parameters, such as, for example, the type of printer (7) and/or the type of cartridge (8) and/or the type of printing product (9).

9. Method according to Claim 8, characterised in that a set of such values is stored and in that one of them is selected according to an actual combination of such parameters.

10. Method according to Claim 1, characterised in that said stored document is divided into pages to be printed (2), in that the aforementioned operations are performed in order to determine the number of switched-on pixels (6) corresponding to each page and in that the quantity of printing product or products necessary for printing each page is derived therefrom.

11. Method according to Claim 10, characterised in that the necessary quantities of the printing product or products for all the pages are added (120).

12. Method according to Claim 1, characterised in that it consists of producing an item of information which can be used by a user from the determined necessary printing product quantity or quantities.

13. Method according to Claim 1, characterised in that it is implemented in a computer (20) connected to a printer (210).

14. Method according to Claim 1, characterised in that it is implemented in a computer connected by network (400) to another computer connected to a printer.

15. Device for predicting the quantity of a printing product necessary for

printing a document, characterised in that it has means for storing the whole of said document in the form of digital data, means for creating, from these data, a table describing at least part of a monochromatic component of said document, said component corresponding to said printing product and each cell in said table

5 representing a pixel, means for counting (6) the number of so-called switched-on pixels in this table and means for deriving therefrom a necessary quantity (10) of said printing product before enabling or demanding said printing.

16. Device according to Claim 15, characterised in that it has an aforementioned table of limited capacity, less than the capacity necessary for

10 describing said monochromatic component of said document, means for successively entering therein groups of pixels of said monochromatic component of said document and means for on each occasion counting (6) the number of switched-on pixels until the whole of said monochromatic component of said document has been entered in said table and its switched-on pixels have been

15 counted.

17. Device according to Claim 16, characterised in that it has means for creating each table of limited capacity from numerical data representing adjacent bands (3) of said document.

18. Device according to Claim 17, characterised in that it has

20 means for selecting overlapping broadened bands (3), means for creating at least one enlarged table from the corresponding digital data, allowing an image reprocessing entailing a modification of the switched-on pixels, means for modifying said table by applying a known correction algorithm (5) and means for deducting the counting (6) of the switched-on pixels corresponding to the

25 excess part of said enlarged table.

19. Device according to Claim 18 for colour printing, characterised in that it has means for creating as many enlarged tables as there are colours, each describing a monochromatic component of said document, means for applying, in a manner known per se, a correction algorithm to all the tables, and

30 means for separately effecting the counting (6) of the switched-on pixels of each table for predicting the different quantities of required printing products, of all the colours concerned.

20. Device according to Claim 15, characterised in that it has calculation means (10) for multiplying the number of switched-on pixels by a value representing an elementary quantity of said printing product.

21. Device according to Claim 20 for an inkjet printing system, characterised in that said value represents the volume of a droplet of ejected printing product.

22. Device according to Claim 21, characterised in that it has means for preselecting said value as a function of predetermined parameters, such as, for example, the type of printer (7) and/or the type of cartridge (8) and/or the type of printing product (9).

23. Device according to Claim 22, characterised in that it has storage means for storing a set of such values and means for selecting one of them according to an actual combination of such parameters.

24. Device according to Claim 15, characterised in that it has means for dividing said stored document into pages to be printed (2), means for determining the number of switched-on pixels (6) corresponding to each page and means for deriving therefrom the quantity of printing product or products necessary for printing each page.

25. Device according to Claim 24, characterised in that it has means (120) for adding the necessary quantities of printing product or products for all the pages.

26. Device according to Claim 15, characterised in that it has means for producing an item of information which can be used by a user from the determined necessary printing product quantity or quantities.

27. Device according to Claim 15, characterised in that it has a computer (20) and a printer (210).

28. Device according to Claim 15, characterised in that it has a computer connected by network (400) to another computer connected to a printer.

29. Method according to Claim 1, for managing printing product resources available in a colour printer containing several reservoirs of different printing products, characterised in that it consists of dividing (2) a document stored in

the form of digital data, into groups of such data representing pages, predicting (10) the quantity of each printing product necessary for printing each page, also measuring (317, 324, 315), before printing, the quantity of printing product actually available in each reservoir, seeking a selection of pages (415) which would ensure the exhaustion, at least approximately simultaneously, of at least one group of reservoirs, and at least sending a message or triggering the implementation of a processing, entailing said selected pages, such as for example the printing of such selected pages.

30. Method according to Claim 29, characterised in that it consists of predicting the quantity of each printing product necessary for printing pages in their natural order, updating, after each series of predictions concerning a page, the quantity of each printing product which would actually be available in each reservoir, checking (406) after each updating whether at least several reservoirs are almost empty, actually printing the pages thus tested and at least sending a message (408), indicating the need to change or fill the reservoirs.

31. Method according to Claim 30, characterised in that, after changing reservoirs, the processing (417) is resumed on the remaining pages, considering a reduced number of pages.

32. Method according to Claim 30, characterised in that, during the processing of the pages in their natural order, the predicted quantities of products consumed for each page are stored, with a view to a possible need for selection.

33. Method according to Claim 29, characterised in that, in order to carry out a selection, it is checked, page after page, whether there is a change from a state where all the reservoirs in said group are not empty to a state (411) where at least one of them is completely empty, and such a selection (415) is decided on when this event occurs.

34. Method according to Claim 33, characterised in that, when such a selection is decided on, the quantity of each printing product necessary for printing the remaining pages is predicted and stored.

35. Method according to Claim 32, characterised in that, when such a selection is decided on, the quantity of each printing product necessary for printing

the remaining pages is predicted and stored and in that said selection consists of

seeking a sub-group of pages (620) whose printing would result in at least several reservoirs being almost empty at the end of the printing of these pages.

36. Method according to Claim 35, characterised in that said sub-group is such that all the structurally related reservoirs (61) forming a cartridge would be empty at the end of the printing of this sub-group.

37. Method according to Claim 35, characterised in that said sub-group is such that several structurally related reservoirs forming a cartridge would be empty at the end of the printing of this sub-group.

38. Method according to Claim 36, characterised in that said sub-group (627) is actually printed when it can be determined and in that at least one message (628) is sent indicating the need to change or fill reservoirs.

39. Method according to Claim 29, characterised in that it consists of predicting said quantity of such a product necessary for printing such a page, describing this page by pixels (4) and counting (6) the switched-on pixels corresponding to said printing product.

40. Method according to Claim 39, characterised in that the prediction of each printing product necessary consists, using said digital data on the page under consideration, of creating a table (T_a, T_b, T_c, T_d) describing at least part of a monochromatic component of said document, said component corresponding to said printing product and each cell of said table representing a pixel, counting the number of switched-on pixels in this table and deriving therefrom a necessary quantity of aforementioned corresponding printing product.

41. Method according to Claim 40, characterised in that an aforementioned table (T) is created with limited capacity, less than the capacity necessary for describing said monochromatic component of said page, in that there are entered successively therein groups of pixels of said monochromatic component of said page, in that on each occasion the number of switched-on pixels are counted until all said monochromatic component of said page has been entered in said table and its switched-on pixels have been counted (Figure 3).

42. Method according to Claim 41, characterised in that it consists of creating each table of limited capacity from digital data representing adjacent bands of said page.

43. Method according to Claim 42, characterised in that overlapping broadened bands are selected, in that, using the corresponding digital data, at least one enlarged table (103) is created, allowing an image reprocessing entailing a modification of the switched-on pixels, in that said table is modified by applying a known correction algorithm (111) and in that the counting of the switched-on pixels corresponding to the excess part of said enlarged table is excluded.

44. Method according to Claim 43 for colour printing, characterised in that as many enlarged tables (103) are created as there are printing products, each describing a monochromatic component of said page, in that, in a manner known per se, a correction algorithm (111) is applied to all the tables before separately effecting the counting of the switched-on pixels in each table for predicting the different quantities of printing products required, of all the colours concerned.

45. Method according to Claim 40, characterised in that it includes a calculation step consists of multiplying (10) the number of switched-on pixels by a value representing an elementary quantity of said printing product.

46. Method according to Claim 45 for an inkjet printing system, characterised in that said value represents the value of a droplet of printing product ejected.

47. Method according to Claim 46, characterised in that said value is preselected according to predetermined parameters, such as, for example, the type of printer (7) and/or the type of cartridge (8) and/or the type of printing product (9).

48. Method according to Claim 47, characterised in that a set of such values is stored and in that one of them is selected according to an actual combination of such parameters.

49. Method according to Claim 1, characterised in that the measurement or measurements of a quantity of product actually available

consist of arranging a capacitive branch including said reservoir (312a, 312d), applying an alternating signal (317) to this capacitive branch and analysing a resulting signal (315) in order to derive therefrom said quantity of printing product actually available.

50. Device according to Claim 15 for managing printing product resources available in a colour printer containing several reservoirs of different printing products, characterised in that it has means for dividing (2) a document stored in the form of digital data, into groups of such data representing pages, means for predicting (10) the quantity of each printing product necessary for printing each page, means for measuring (317, 324, 315), before printing, the quantity of printing product actually available in each reservoir, means for seeking a selection of pages (415) which would ensure the exhaustion, at least approximately simultaneously, of at least one group of reservoirs, and means for sending a message and/or triggering the implementation of a processing, entailing said selected pages, such as for example the printing of such selected pages.

51. Device according to Claim 50, characterised in that said means for predicting being used for predicting the quantity of each printing product necessary for printing pages in their natural order, it has means for updating, after each series of predictions concerning a page, the quantity of each printing product which would actually be available in each reservoir, means for checking (406), after each updating, whether at least several reservoirs are almost empty, and means for sending a message (408), indicating the need to change or fill reservoirs.

52. Device according to Claim 51, characterised in that it has means for storing the predicted quantities of products consumed for each page, during a processing of the pages in their natural order, with a view to a possible need for selection.

53. Device according to Claim 52, characterised in that it has means for predicting the quantity of each printing product necessary for printing the remaining pages and means for storing them, when a selection is decided on.

54. Device according to Claim 52, characterised in that it has means for predicting the quantity of each printing product necessary for printing the

remaining pages and means for storing them when a selection is decided on and in that said means for seeking a selection include means for seeking a sub-group of pages (620) whose printing would result in at least several reservoirs being almost empty at the end of the printing of these pages.

5   55. Device according to Claim 50, characterised in that it has means for predicting said quantity of such a product necessary for printing such a page, comprising means for describing this page by pixels (4) and means for counting (6) the switched-on pixels corresponding to said printing product.

56. Device according to claim 55, characterised in that it has means

10   for creating a table (T_a, T_b, T_c, T_d) describing at least part of a monochromatic component of said document, said component corresponding to said printing product and each cell of said table representing a pixel, means for counting the number of switched-on pixels in this table and means for deriving therefrom a necessary quantity of aforementioned corresponding printing product.

15   57. Device according to Claim 56, characterised in that it has an aforementioned table of limited capacity, less than the capacity necessary for describing said monochromatic component of said page, means for successively entering therein groups of pixels of said monochromatic component of said page and means for on each occasion counting the number of switched-on pixels until the

20   whole of the said monochromatic component of said page has been entered in said table and its switched-on pixels have been counted (Figure 3).

58. Device according to Claim 57, characterised in that it has means for creating each limited-capacity table from digital data representing adjacent bands of said page.

25   59. Device according to Claim 58, characterised in that it has means for selecting overlapping broadened bands, means for creating at least one enlarged table (103) from the corresponding digital data, allowing an image reprocessing entailing a modification of the switched-on pixels, means for modifying said table by applying a known correction algorithm (111) and means

30   for deducting the counting of the switched-on pixels corresponding to the excess part of said enlarged table.

~~60. Device according to Claim 59~~ for colour printing, characterised in that it has means for creating as many enlarged tables (103) as there are printing products, each describing a monochromatic component of said page, means for applying, in a manner known per se, a correction algorithm (111) to

5 all the tables and means for separately effecting the counting of the switched-on pixels of each table for predicting the different quantities of required printing products, of all the colours concerned.

61. Device according to Claim 56, characterised in that it has calculation means for multiplying (10) the number of switched-on pixels by a

10 value representing an elementary quantity of said printing product.

62. Device according to Claim 61 for an inkjet printing system, characterised in that said value represents the volume of a droplet of ejected printing product.

63. Device according to Claim 62, characterised in that it has

·15 means for preselecting said value as a function of predetermined parameters, such as, for example, the type of printer (7) and/or the type of cartridge (8) and/or the type of printing product (9).

64. Device according to Claim 63, characterised in that it has storage means for storing a set of such values and means for selecting one of

20 them according to an actual combination of such parameters.

65. Device according to Claim 50, characterised in that said means for measuring a quantity of product actually available include a capacitive branch including said reservoir (312a, 312d), means for applying an alternating signal (317) to this capacitive branch and means for analysing a resulting signal

25 (315) in order to derive therefrom said quantity of printing product actually ~~available.~~

66. Information storage means, characterised in that it contains a program at least partially implementing the method according to one of Claims 1 or 29.

30 67. Storage means according to Claim 66, characterised in that it is chosen from the group of devices including a magnetic tape, a magnetic diskette, a fixed-memory compact disc and a rewriteable compact disc.

68. Storage means according to Claim 66, characterised in that it can be read by a computer or a microprocessor.